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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,503	02/12/2004	Masato Naito	2927-0167P	3677

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EXAMINER	
LEIVA, FRANK M	

ART UNIT	PAPER NUMBER
3714	

NOTIFICATION DATE	DELIVERY MODE
07/27/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/776,503	NAITO ET AL.	
	Examiner	Art Unit	
	FRANK M. LEIVA	3714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/11/2009; 06/05/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11 March 2009 has been entered.

Acknowledgements

2. The examiner acknowledges claim amendments filed 11 March 2009, including amendments to claims 1-6.

Response to Arguments

3. Applicant's arguments filed 11 March 2009 have been fully considered but they are not persuasive.

4. First, regarding the remark on line 11 of page 8 of applicant's remarks, "*The Examiner's characterization of the disclosure in Soong is incorrect and misleading. Soong discloses a club head with a face plate that is pre-tensioned.*" Applicant's assertion of Soong's invention is narrowed by the direct description of Soong's invention as to be only the club head itself, and while the examiner agrees that Soong discloses a club head made with a pre-tensioned plate, the examiner also indicates that the teachings in the description also indicate method of designing such a club including where the thickness of the plate varies along the sweet spot. Soong's invention is a declaration of a golf club head designed using finite element analysis (Soong; col. 3:58-64), said comparison position being the central area of the face plate (Soong; col.4:1-2). Also the material is pre-tensioned the face element is also varied in thickness from 0.2 mm to 1.0 mm (Soong; col. 4:9-10).

5. Second, regarding the remarks on line 9 of page 9 of applicant's remarks, "*There is no disclosure or suggestion whatsoever in Galloway of "adjusting the thickness of finite elements of said face part at said comparison hitting positions so that the difference between the stress at said comparison hitting positions and the stress at said reference position does not exceed a predetermined value" or of thickening and thinning finite elements of the face part so that "said stress generated at said reference hitting position and said stresses generated at said comparison hitting positions are made substantially uniform.*" Galloway's disclosure shows that the adjustment of the thickness of finite elements of said face plate to compensate for the different stresses is mentioned several times in (Galloway; col. 10:37-62), all covered on figures 26-29.

6. Third, applicant's remark on page 9, "*Applicant submits that there is no basis in either Soong or Galloway for a modification of Galloway that the Examiner apparently is proposing,*" the examiner points to Soong being modified by Galloway, where the design of a golf club head using finite element virtual simulation of Soong can create a Galloway Golf club head by changing the thickness of the material of the face plate according to virtual representation instead of empirical data as done with Galloway in the past.

7. Last, applicant's remark on page 10, "*As observed above, neither of the references applied by the Examiner offers a disclosure of a method of designing a golf club in which the thickness of the face is adjusted based on calculated stresses in the club face*", the examiner asserts that neither disclosure is about designing a club head, but both disclosed the method and data calculated to design the club head. Finite analysis of stresses are calculated stresses and used to design the club heads COR (Coefficient of Restitution).

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amended claim 1 now includes "*adjusting the thickness of finite elements of said face part at said comparison hitting positions so that the difference between the stress at said comparison hitting positions and the stress at said reference position does not exceed a predetermined value,*" the specification does not mention a predetermined value and a maximum value for the difference between the comparisons. Claims 2-15 are rejected for their dependency of claim 1.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soong (US 5,931,746) in view of Galloway et al (US 6,354,962 B1).

12. Soong discloses a method of designing a club using a finite element modeling of a golf ball impacting a club head face.

13. Galloway discloses the use of experimental data to calculate stresses in a club head face and adjusting the thickness according to the stress data and Coefficient of Restitution (COR) data.

14. Regarding claim 1; Soong discloses a method of designing a golf club head by using a computer, comprising the steps of using a club head model and a ball model both of which are composed of a plurality of divided finite elements, (fig. 3 and col. 3:58-64);

executing a simulation of impacting said club head model against said ball model at a reference hitting position set in a sweet area of a face part of said club head model and a plurality of comparison hitting positions set outside said sweet area, (fig. 3 and col. 3:58-4:10), wherein the circular plate 41 is the sweet spot, and the finite element of an impact simulation must have a model of both objects being impacted, that is the ball and the club head. Soong uses deflection distance D from which along with (col. 4:50-65) known material stress factors, can calculate the thermal stresses in the model, thus; computing a stress generated in each of said finite elements by an analysis based on a finite element method, when said club head model impacts said ball model at said reference hitting position and said comparison hitting positions;

Soong is silent to controlling a thickness distribution across the face of the head. However, Galloway discloses comparing said stress generated at each of said comparison hitting positions with said stress generated at said reference hitting position, (fig. 24) is a graphical representation of a comparison of hitting positions at different thicknesses;

adjusting the thickness of the finite elements of said face part at said comparison positions so that the difference between the stress at said comparison hitting positions and the stress at said reference position does not exceed a predetermined value, (col 10:63-col. 11:6 and col. 11 53-56) the predetermined value range to be a COR between 0.83 and 0.93; and

if said stresses generated at said comparison hitting positions are larger than said stress generated at said reference hitting position, finite elements of said face part

disposed at said comparison hitting positions are thickened, whereas if said stresses generated at said comparison hitting positions are smaller than said stress generated at said reference hitting position, finite elements of said face part disposed at said comparison hitting positions are thinned, whereby said stresses generated at said comparison hitting positions are approximated to said stress generated at said reference hitting position, (fig. 24 and 25) shows small changes of increasing the thickness the tress is reduced; and whereby

said stress generated at said reference hitting position and said stresses generated at said comparison hitting positions are made substantially uniform, (fig. 24) where the convergence of the reference positions show the same value stresses or uniformity across the face.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use a mathematical model instead of an experimental data to calculate the different thicknesses across the face of the golf club and reduce cost of development; and by using the data available from Soong and Galloway, and as expressed by Galloway to maximize elasticity without compromising the structural stress limits of the materials by thickening certain areas of the face and keeping the COR at the standards level.

15. Regarding claim 2; As applied above, the combination of Soong and Galloway discloses all of the limitations recited in claim 1, from which claim 2 depends, and Galloway further discloses that said club head model consists of a wood club head model a control of said thickness distribution of each of said finite elements of said face part is executed by controlling a thickness of a metal plate composing said face part of said wood club head model, (col. 8:44-60). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention after modifying Soong with Galloway to include the wood club heads of Galloway in the combination for the same reasons covered above in claim 1's club head.

16. Regarding claim 3; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claim 1, from which claim 3 depends, and Galloway further discloses wherein a Mises' stress generated in each of said elements when said ball model is hit with said club head model is computed from a main stress value at an integration point of each of said elements; and a maximum value of said Mises' stress at each of said hitting positions is computed from a change of a time series of said found Mises' stress, and finite elements of said face part disposed at said comparison hitting position generating a smaller maximum value of said Mises' stress than a maximum value of said Mises' stress at said reference hitting position are thinned (figs. 24) whereby thinning the thickness ratio from 1.15 to 1.05 reduces the average change of the Mises stress values including the maximum values for the required COR, and

whereas finite elements of said face part disposed at said comparison hitting position generating a larger maximum value of said Mises' stress than said maximum value of said Mises' stress at said reference hitting position are thickened, (figs. 24) whereby increasing from 1.05 to 1.15 increases the average maximum stress value for the required COR. It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to used the variations in thickness and related stress according to the data to manipulate the thickness of the club head face in order to maintain the level of COR required by the industry standard.

17. Regarding claim 4; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claims 1 and 2, from which claim 4 depends on, and Galloway further discloses wherein a Mises' stress generated in each of said elements when said ball model is hit with said club head model is computed from a main stress value at an integration point of each of said elements (fig. 12 and col. 8:10-34) area 111; and a maximum value of said Mises' stress at each of said hitting positions is computed from a change of a time series of said found Mises' stress, and finite elements of said face part disposed at said comparison hitting position generating a smaller maximum value of said Mises' stress than a maximum value of said Mises'

stress at said reference hitting position are thinned, whereas finite elements of said face part disposed at said comparison hitting position generating a larger maximum value of said Mises' stress than said maximum value of said Mises' stress at said reference hitting position are thickened, (fig. 28, col. 4:66-5:4 and col. 10:52-56) showing variations in thickness and generated related stresses accordingly and reference positions. It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to use the variations in thickness and related stress according to the data presented in Galloway to modify Soong's virtual simulation to create a more accurate representation and aiding the design of the club head.

18. Regarding claims 5 and 6; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claims 1-4, from which claims 5 and 6 depend on, and Galloway further discloses wherein when said ball model is hit with said club head model at an initial speed of 40m/second a maximum value of said Mises' stress generated at said reference hitting position and a maximum value of said Mises' stress generated at said comparison hitting positions is computed, a thickness of said finite element of said face part disposed at said comparison hitting position is altered so that a difference between said maximum value of the Mises' stress generated at said reference hitting position and said maximum value of the Mises' stress generated at said comparison hitting positions is not more than 8 kgf/mm^2; and a simulation of impacting said club head model against said ball model is repeatedly executed to determine said thickness distribution, as shown in the specifications the speed of impact simulated and the maximum stress for generating the output are simply arbitrary, yet, (col. 9:36-59); Galloway goes farther to explain that the maximum stress for the Great Big Bertha being used as the reference is 29 ksi (kilo pound force/ in^2) or 20.38 Kgf/mm^2, and that the testing should not exceed it, making the 8 kgf/mm^2(or 11.37 ksi), within range.

As noted above; it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to combine Soong with Galloway producing the predictable invention disclosed in claim 1, and as such all the disclosures of Galloway

such as having a set goal stress level across the face of the club would also be included in the combination so as to be able to compute the appropriate thicknesses for the club head face plate. To calculate the thickness distribution it is necessary to have all the data for the equation like COR and Maximum and minimum acceptable Mises stresses.

19. Regarding claim 7; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claim 1, from which claim 7 depends on, and Galloway further discloses wherein said reference hitting position is located inside a sweet area of said face part, (fig. 12A, #111) and said comparison hitting position is formed at not less than three points outside said sweet area (fig. 12A, #102, #104 and #106, and col. 8:10-34); and said reference hitting position is located in a region surrounded with straight lines connecting said comparison hitting positions, (fig. 12A), where the graphs represent face center, face crown and face sole, located in three different levels from center of sweet spot.

It is obvious to one of ordinary skill in the art at the time of applicants invention after reading Galloway, to modify Soong's invention to create comparison hitting positions in a radius from the center of the face and manipulate the thickness accordinly to increase the Coefficient of Restitution.

20. Regarding claims 8-10; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claims 1-4, from which claims 8-10 depend on, and Galloway further discloses wherein said reference hitting position is located inside a sweet area of said face part, and said comparison hitting position is formed at not less than three points outside said sweet area (fig. 12A, #102, #104 and #106, and col. 8:10-34); and said reference hitting position is located in a region surrounded with straight lines connecting said comparison hitting positions, (fig. 24-28), where all comparison hitting positions are graphed within the center area and connected with straight lines.

It is obvious to one of ordinary skill in the art at the time of applicants invention after reading Galloway, to modify Soong's invention to create comparison hitting

positions in a radius from the center of the face and manipulate the thickness accordinly to increase the Coefficient of Restitution

21. Regarding claims 11-15; As applied above, the combination of Soong and Galloway discloses all the limitations recited in claims 1-5, from which claims 11-15 depend on, and Galloway further discloses wherein said comparison hitting position is formed at two points, with one point disposed upward from said reference hitting position and the other point disposed downward therefrom, and at two points with one point disposed at a left-hand side of said reference hitting position and the other point disposed at a right-hand side thereof, (fig. 1A) showing H and W directions, (col. 3:15-25), showing the values used in the graph for calculating aspect ratio, and being that the graphical data compares all points of the surface area in a finite element analysis.

It would have been obvious to one of ordinary skill in the art to use the data displayed in the graphs and dispose the comparison hitting positions in quadrant such ad above below left and right of the center position to graph the finite element thicknesses for calculation and implementation.

Examiner's Note

22. Examiner has cited paragraphs and figures in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant, in preparing the responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

23. Examiner has used conversions to match the art of record with the applicant's values as follows;

1 Kilo pound force/in^2 = .703 Kilogram force/mm^2.

1 meter/second = 2.237 mph

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK M. LEIVA whose telephone number is (571)272-2460. The examiner can normally be reached on M-Th 9:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter D. Vo can be reached on (571) 272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES S. MCCLELLAN/
Primary Examiner, Art Unit 3714
FML
07/15/2009